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THE WEBB LAW FIRM, P.C.
700 KOPPERS BUILDING
436 SEVENTH AVENUE
PITTSBURGH, PA 15219

EXAMINER	
BAREFORD, KATHERINE A	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/540,451	SUGIYAMA ET AL.	
	Examiner	**Art Unit**	
	Katherine A. Bareford	1715	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-6,13,14,17 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-6,13,14,17 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed November 12, 2010 has been received and entered. With the entry of the amendment, claims 1, 2, 7-12, 15-16, 18-20 and 22-23 are canceled, and claims 3-6, 13, 14, 17 and 21 are pending for examination.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3-6, 13, 14, 17 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3, line 7, “prior to applying plating” is confusing as worded, because applicant later refers to “electroless plating” but not "plating" in general or other forms of plating. If applicant is referring to the “electroless plating” that the phrase should be clarified to read “prior to <u>electroless</u> plating”. For the purpose of examination, the examiner has treated the phrase as referring to prior to applying the described electroless plating, but applicant should clarify what is intended, without adding new matter.

Claim 3, lines 12-13, “a thickness of the polymer electrolyte in a swollen state is 130% or more with respect to that of the polymer electrolyte in a dry state” is confusing

as worded, because this swollen state of 130% or more is not actually required by the "pre-treatment step" as now worded. The pre-treatment step is claimed as a swelling step with a good solvent/or mixed solvent containing a good solvent, but it is not connected that the "swelling step" in the "pre-treatment step" requires that the described "swollen state" be achieved. The "swollen state" could occur in a different step or part of the process, or simply be a description of what could happen, which moreover is not necessarily described by the application as filed. For the purpose of examination, the examiner has treated the phrase as requiring "the swelling step is a step for making a thickness of the polymer electrolyte in a swollen state [[is]] 130% or more with respect to that of the polymer electrolyte in a dry state", but applicant should clarify what is intended, without adding new matter.

The other dependent claims do not cure the defects of the claims from which they depend.

Claims

4. The Examiner understands that in the reference to "double-layer capacitance" in the last two lines of claim 3, "capacitance" is used equivalent to "capacity", as only the term "capacity" was used in the disclosure as filed.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-5, 13, 17 and 21: are rejected under 35 U.S.C. 103(a) as being unpatentable over Fedkiw, Jr (US 4959132) in view of the admitted state of the prior art and Munshi (US 6426863).

Claims 3, 5: Fedkiw teaches a method for electroless plating (where plating occurs by reducing a metal complex to form a metal film). Column 2, lines 15-40. The substrate is a polymer electrolyte, and can be in the form of a solid polymer membrane of a perfluorosulfonic acid polymer such as NAFION. Column 4, lines 25-40. Fedkiw provides that the polymer electrolyte is desirably swelled using a co-solvent in

conjunction with an ionic salt of the selected metal to form the film to thereby increase the loading level and lower diffusional resistance therein (and thus can be described as swelled with (1) a solution containing a good solvent and (2) a solution containing salt). Column 2, lines 49-60. Fedkiw provides forming the metal film by the electroless process of impregnating a metal salt of the desired metal such as platinum in a cosolvent such as methanol/water (thus an aqueous solution) and adsorbing the metal salt (metal complex) into the polymer electrolyte. Column 4, lines 35-50. Then, the polymer electrolyte is contacted with a reductant solution to reduce the metal complex to the metal(0) state and form the metal film on the polymer electrolyte (thus forming a laminate as claimed). Column 2, lines 30-40, column 4, lines 50-65.

Fedkiw teaches all the features of these claims except (1) that the swelling step is pretreatment before an electroless plating, (2) that the swelling is at least 130% of the thickness of the polymer electrolyte, and (3) the plating is part of a process of forming an actuator element where the laminated formed by the electroless plating process, and the formed laminate has an electric double layer capacitance of 3 mF/cm^2 or more when a thickness of the laminate is converted to 170 microns. However, the admitted state of the prior art teaches that it is well known to provide a electroless metal plating on a polymer electrolyte by a process of immersing the polymer electrolyte in water to swell it, adsorbing a metal complex such as a platinum complex into the polymer electrolyte in a aqueous solution, and reducing the metal complex with a reducing agent – where the adsorption/reduction steps are repeated six or more times to provide sufficient

amounts of metal on the polymer electrolyte, and that this process is used to form a laminate as part of forming an actuator element formed from the laminate comprising a metal layer and polymer electrolyte. See pages 2-3 of the present specification. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Fedkiw to perform multiple adsorption/reduction cycles on the polymer electrolyte to provide a desired amount of metal on the polymer electrolyte as suggested by the admitted state of the prior art is conventional in the practice of adsorption/reduction electroless plating. Since any adsorption/reduction cycle can be considered an electroless plating step, the first adsorption/reduction cycle of Fedkiw using the swelling with solvent/salt can be considered a pretreatment to the later adsorption/reduction cycles and therefore meets the requirements of the claims of providing a swelling pretreatment with solvent and/or salt. While the claim language provides that the pretreatment step is carried out before plating, it is not required to be carried out before "any" plating, as long as a plating step occurs after the pretreatment step. (2) As to the amount of swelling from the solvent/salt solution, it would have been obvious to one of ordinary skill in the art to perform routine experimentation to optimize the amount of swelling done with the solvent/salt solution of Fedkiw to give the claimed amount of swelling of 130% or more, as Fedkiw teaches to use polymer material (NAFION) and solvent (methanol) described by applicant as achieving the desired swelling, and also indicates swelling is to increase loading level (column 2, lines 50-55) and solution concentration and time of immersion, among other factors, are to be

controlled to achieve desired loading (column 4, lines 40-50), indicating swelling would be a result effective variable to be controlled with solution control to optimize loading, and "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). (3) As to forming an actuator element, it would have been obvious to one of ordinary skill in the art to use the plating process to form an actuator element with a laminate of the metal layer plated on the polymer electrolyte when performing the process of Fedkiw in view of the admitted state of the prior art, to provide a desirable product, since the admitted state of the prior art teaches that a desirable use for such metal plated polymer electrolytes is as actuators. Furthermore, as to the formed laminate having the claimed electric double-layer capacitance, Munshi teaches that when providing polymer electrolyte layers connected to anode and cathodes (electrodes), it is desired to provide high capacity (capacitance) and that high surface area provides for large double layer capacity (column 12, line 60 through column 13, line 5). Therefore, it would have been obvious to one of ordinary skill in the art to modify Fedkiw in view of the admitted state of the prior art to increase the double layer capacity to as large as possible as suggested by Munshi and that the optimization of swelling as part of the swelling process as discussed above will help achieve this desired increased double layer capacity, since such swelling will give a high surface area to help provide increased double layer capacity, as Fedkiw in view of the admitted state of the prior art provides a

laminate of polymer electrolyte/electrode layers as actuators, and Munshi teaches that polymer electrolyte layers/electrode layers desirably have high double layer capacity and that large double layer capacity is provided with high surface area of contact, and Fedkiw in view of the admitted state of the prior art provides a swelling optimization of that will give a high surface area to help provide increased double layer capacity. Moreover, since the same 130% swelling described by applicant as achieving the desired double layer capacitance is provided by the optimization of the swelling, the same resulting double layer capacitance as claimed would be understood to occur by following the process of Fedkiw in view of the admitted state of the prior art and Munshi. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claims 4, 13: As Fedkiw teaches that the same polymer (NAFION) electrolyte and same solvent (methanol) (column 4, lines 30-50) can be used as described by applicant, the Examiner understands that the methanol use described would inherently provide reducing the degree of crystallization as claimed. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Claim 17: Fedkiw provides that the polymer electrolyte would be an ion-exchange resin (note the ion exchange process). Column 4, lines 25-50.

Claim 21: Fedkiw teaches that the "good solvent" of methanol can be used. Column 4, lines 45-50 (CH_3OH = methanol).

8. Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fedkiw in view of the admitted state of the prior art and Munshi as applied to claims 3-5, 13, 17 and 21 above, and further in view of Burch (US 5024858).

Fedkiw in view of the admitted state of the prior art and Munshi teaches all the features of these claims except the solvent being a mixed solution of a basic salt and methanol. Fedkiw does teach that the polymer electrolyte can be an ion exchange resin and that the solution can include methanol. Column 4, lines 25-50 (note the material of the substrate).

However, Burch teaches that it is well known, when treating polymers with adsorption/reduction processes (column 4, lines 40-55) that the polymers can be swelled by using a combination of both a solvent and a base in the form of a basic salt (see column 4, line 55 through column 5, line 25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fedkiw in view of the admitted state of the prior art and Munshi to further provide a basic salt in the metal salt/methanol/water solution as suggested by Burch to increase swelling of the polymer, as Fedkiw in view of the

admitted state of the prior art and Munshi provides swelling of the polymer using a solvent solution and Burch teaches that desirable swelling can also be provided by further adding basic salts to a solvent solution.

9. Claims 3-6, 13, 14, 17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the prior art in view of Ventura et al (US 5731104), Sopchak et al (US 4820553) and Munshi (US 6426863).

Claims 3, 5, 21: The admitted state of the prior art, at pages 2-4 of the specification, provides that it is well known to provide an actuator made of a laminate composed of a polymer electrolyte and metal electrodes bonded to the surface of the polymer electrolyte. To provide the metal electrodes, it is known to electrolessly plate the metal on the polymer electrolyte, including using a process to surface roughen the polymer electrolyte, then immerse in water to swell, then a metal complex is adsorbed to the polymer electrolyte (resin membrane) in an aqueous solution, and the adsorbed metal complex is reduced with a reducing agent -- where the adsorption/reducing cycles are repeated six or more times to provide sufficient amounts of metal on the polymer electrolyte.

The admitted state of the prior art teaches all the features of these claims except (1) that a swelling step is performed before electroless plating using a permeation of a good solvent (or mixed solvent containing a good solvent) and/or salt (such as an aqueous solution with methanol and basic salt), where the swelling step makes the

thickness of the polymer electrolyte at least 130% or more with respect to that of the polymer electrolyte in a dry state, and (2) that the laminate has an electric double layer capacitance of 3 mF/cm^2 or more when a thickness of the laminate is converted to 170 microns. However, Ventura provides that known solid polymer electrolytes can be made from polyesters or other resins (column 11, lines 25-30). Furthermore, Sopchak provides that before electrolessly plating resins such as polyesters it is desirable to condition the surfaces to improve adhesion of a metal coating deposited (column 2, lines 35-40), where the conditioning treatment involves exposing the article to a solvent system composition that comprises water (aqueous) and an organic solvent and solvated hydroxyl ions (column 2, lines 35-40), where the hydroxyl ions can be basic salts such as sodium hydroxide (column 4, lines 10-30), and the organic solvents are desirably solvents that swell the polymer (also showing that the solution composition will permeate the substrate), such as methanol (column 4, lines 50-65). The conditioning composition etches the surface and the amount of materials of solvents and hydroxyl ions should be optimized, as well as exposure time (column 5, line 50 through column 6, line 15, column 5, lines 10-25, column 3, lines 50 through column 4, line 10). After the conditioning treatment, the surfaces can be electroless plated by conventional methods (column 9, lines 5-15). Therefore, (1) (2) it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art to use a polyester as the polymer electrolyte as suggested by Ventura with an expectation of desirable actuator forming, as the

admitted state of the prior art teaches to plate a polymer electrolyte to form an actuator, and Ventura teaches that a well known polymer electrolyte material is polyester; and furthermore, it would have been obvious to modify the admitted state of the prior art in view of Ventura to further use the pretreatment conditioning of Sopchak with an expectation of providing a desirably improved coating adherence, because the admitted state of the prior art teaches that it is desirable to provide a roughening pretreatment before the electroless plating, and Sopchak teaches that a desirable pretreatment (that would also provide roughening by way of etching) before electroless plating on polyester is using a solvent/hydroxyl ion composition, such as water/methanol/sodium hydroxide (basic salt), for example, that permeates and swells the polyester. As to the exact amount of swelling from the solvent/hydroxyl ion solution, it would have been obvious to one of ordinary skill in the art to perform routine experimentation to optimize the amount of swelling done with the solvent/hydroxyl ion solution for the specific substrate used to be in the claimed range, as Sopchak teaches the desire for the organic solvent to be such as to swell the substrate and to optimize time of exposure and amount of solvent used for the particular application used, which will, when optimized, provide an optimized swelling, since the substrate used, solvent, amount of solvent used, and time of exposure will control the resulting swelling. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Furthermore, as to the formed laminate having the claimed electric double-layer capacitance, Munshi teaches that when providing polymer electrolyte layers connected to anode and cathodes (electrodes), it is desired to provide high capacity (capacitance) and that high surface area provides for large double layer capacity (column 12, line 60 through column 13, line 5). Therefore, it would have been obvious to one of ordinary skill in the art to modify the admitted state of the prior art in view of Ventura and Sopchak to increase the double layer capacity to as large as possible as suggested by Munshi and that the optimization of swelling as part of the swelling process as discussed above will help achieve this desired increased double layer capacity, since such swelling will give a high surface area to help provide increased double layer capacity, as the admitted state of the prior art in view of Ventura and Sopchak provides a laminate of polymer electrolyte/electrode layers as actuators, and Munshi teaches that polymer electrolyte layers/electrode layers desirably have high double layer capacity and that large double layer capacity is provided with high surface area of contact, and the admitted state of the prior art in view of Ventura and Sopchak provides a swelling optimization of that will give a high surface area to help provide increased double layer capacity. Moreover, even if the admitted state of the prior art in view of Ventura and Sopchak did not specifically suggest to the optimize the swelling, Munshi would further indicate to optimize the double layer capacity to be as large as possible (and resultingly in the claimed range), and to provide the suggestion to optimize the swelling of the polymer when using the swelling solvents as described by Sopchak so as

give the higher surface area desired for improved double layer capacity. Moreover, since the same at least 130% swelling described by applicant as achieving the desired double layer capacitance is provided by the optimization of swelling, the same resulting double layer capacitance as claimed would be understood to occur by following the process of the admitted state of the prior art in view of Ventura, Sopchak and Munshi. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claims 4, 13: Since the admitted state of the prior art in view of Ventura, Sopchak and Munshi provide treating a polymer electrolyte with methanol, the same solvent used by applicant, the Examiner understands that the methanol use described would inherently provide reducing the degree of crystallization as claimed. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Claims 6, 14, 17: the admitted state of the prior art provides that the polymer electrolyte would be an ion exchange resin (page 2 of the specification).

10. Claims 3-6, 13, 14, 17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the prior art in view of Ventura et al (US 5731104), Lin (US 3650803) and Munshi (US 6426863).

Claims 3, 5, 21: The admitted state of the prior art, at pages 2-4 of the specification, provides that it is well known to provide an actuator made of a laminate composed of a polymer electrolyte and metal electrodes bonded to the surface of the polymer electrolyte. To provide the metal electrodes, it is known to electrolessly plate the metal on the polymer electrolyte, including using a process to surface roughen the polymer electrolyte, then immerse in water to swell, then a metal complex is adsorbed to the polymer electrolyte (resin membrane) in an aqueous solution, and the adsorbed metal complex is reduced with a reducing agent -- where the adsorption/reducing cycles are repeated six or more times to provide sufficient amounts of metal on the polymer electrolyte.

The admitted state of the prior art teaches all the features of these claims except (1) that a swelling step is performed before electroless plating using a permeation of a good solvent (or mixed solvent containing a good solvent) and/or salt (such as a solution with methanol and basic salt), where the swelling step makes the thickness of the polymer electrolyte at least 130% or more with respect to that of the polymer electrolyte in a dry state, and (2) that the laminate has an electric double layer capacitance of 3 mF/cm^2 or more when a thickness of the laminate is converted to 170 microns. However, Ventura provides that known solid polymer electrolytes can be

made from polyesters or other resins (column 11, lines 25-30). Furthermore, Lin provides that before electrolessly plating resins (including polyesters and a wide variety of other resins) it is desirable to condition the surface to activate the surface to allow adherent electroless plating by depositing a phosphorus coating and reacting to form a metal phosphorus coating (column 1, line 30, through column 2, line 50), the depositing of the phosphorus coating is provided by using phosphorus in combination with solvent that permeates and swells the substrate (such as methanol) (column 4, lines 20-55) and with a hydroxide reactant (such as sodium hydroxide, a basic salt) (abstract, column 7, lines 65 through column 8, line 15, for example). The contact time with the substrate varies depending on the nature of the substrate, the solvent, and the temperature and can be 1 second to 1 hour or more (column 5, lines 20-30). A further treatment with a solution of salt and water (aqueous) and swelling solvent (such as methyl alcohol or methanol) contacts (permeates) the substrate to react with the applied phosphorus to form a metal-phosphorus coating, with the contact time of this solution dependent on the nature of the substrate, the salts used and the temperature and can be 1 to 30 minutes (column 5, lines 40-45 and column 6, lines 10-55). After the treating with the phosphorus compound and reacting, electroless plating can take place (column 8, lines 40-55). Therefore, (1) (2) it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art to use a polyester as the polymer electrolyte as suggested by Ventura with an expectation of desirable actuator forming, as the admitted state of the prior art teaches

to plate a polymer electrolyte to form an actuator, and Ventura teaches that a well known polymer electrolyte material is polyester; and furthermore, it would have been obvious to modify the admitted state of the prior art in view of Ventura to further use the pretreatment conditioning of Lin with an expectation of providing a desirably adhered coating, because the admitted state of the prior art teaches that it is desirable to provide a roughening pretreatment before the electroless plating, and Lin teaches that a desirable pretreatment before electroless plating on polyester is using a phosphorus/solvent/hydroxude composition, such as phosphorus/methanol/sodium hydroxide (basic salt), for example, that permeates and swells the polyester and also a further use of an aqueous salt/water/methanol (for example) solution that would also permeate and swell the polymer due to the presence of methanol. As to the exact amount of swelling from the solvent/hydroxyl ion solution or salt/water/methanol solution, it would have been obvious to one of ordinary skill in the art to perform routine experimentation to optimize the amount of swelling done with the phosphorus/solvent/hydroxide solution or salt/water/methanol solution for the specific substrate used to be in the claimed range, as Lin teaches the desire for the organic solvent to be such as to swell the substrate and to optimize time of exposure of solvent used for the particular application used, which will, when optimized, provide an optimized swelling, since the substrate used, solvent, amount of solvent used, and time of exposure will control the resulting swelling. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or

workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, as to the formed laminate having the claimed electric double-layer capacitance, Munshi teaches that when providing polymer electrolyte layers connected to anode and cathodes (electrodes), it is desired to provide high capacity (capacitance) and that high surface area provides for large double layer capacity (column 12, line 60 through column 13, line 5). Therefore, it would have been obvious to one of ordinary skill in the art to modify the admitted state of the prior art in view of Ventura and Lin to increase the double layer capacity to as large as possible as suggested by Munshi and that the optimization of swelling as part of the swelling process as discussed above will help achieve this desired increased double layer capacity, since such swelling will give a high surface area to help provide increased double layer capacity, as the admitted state of the prior art in view of Ventura and Lin provides a laminate of polymer electrolyte/electrode layers as actuators, and Munshi teaches that polymer electrolyte layers/electrode layers desirably have high double layer capacity and that large double layer capacity is provided with high surface area of contact, and the admitted state of the prior art in view of Ventura and Lin provides a swelling optimization of that will give a high surface area to help provide increased double layer capacity. Moreover, even if the admitted state of the prior art in view of Ventura and Lin did not specifically suggest to the optimize the swelling, Munshi would further indicate to optimize the double layer capacity to be as large as possible (and resultingly within the claimed range), and to provide the suggestion to optimize

the swelling of the polymer when using the swelling solvents as described by Lin so as give the higher surface area desired for improved double layer capacity. Moreover, since the same at least 130% swelling described by applicant as achieving the desired double layer capacitance is provided, the same resulting double layer capacitance as claimed would be understood to occur by following the process of the admitted state of the prior art in view of Ventura, Lin and Munshi. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claims 4, 13: Since the admitted state of the prior art in view of Ventura, Lin and Munshi provide treating a polymer electrolyte with methanol, the same solvent used by applicant, the Examiner understands that the methanol use described would inherently provide reducing the degree of crystallization as claimed. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Claims 6, 14, 17: the admitted state of the prior art provides that the polymer electrolyte would be an ion exchange resin (page 2 of the specification).

Response to Arguments

11. Applicant's arguments with respect to claims 3-6, 13, 14, 17 and 21 have been considered but are moot in view of the new ground(s) of rejection.

The new art to Munshi has been provided as to the claimed double layer capacitance.

(A) Regarding the rejection using Fedkiw as the primary reference: As to applicant's argument that even considering that Fedkiw teaches multiple impregnation steps, there is nothing to suggest that any of these impregnation steps constitutes a pre-treatment step or the degree of swelling outlined in the claim is achieved. The Examiner has reviewed this argument, however, the Examiner notes the use of the admitted state of the prior art as to the suggestion to provide multiple adsorption and reduction steps. Furthermore, as to one impregnation step being a pre-treatment step, Claim 3, for example, provides "the method for applying electroless plating contains a pre-treatment step; the pre-treatment step is carried out prior to applying plating to the polymer electrolyte". This means that the pre-treatment step must occur before a plating occurs, but does not require the pre-treatment step to occur before "any" plating (including before "any" electroless plating). There is no limitation that only one electroless plating can be provided, either. Therefore, as worded, an electroless plating can occur, then the "pre-treatment" step can occur (and there is nothing to prevent the pretreatment step from applying a plating by an electroless process), then another electroless plating can occur. Therefore, when multiple electroless platings occur, as by

the suggested multiple “adsorption/reduction” steps (from the combination of Fedkiw with the admitted state of the prior art), a first or even second “adsorption” step can be considered a “pre-treatment” and later "adsorption/reduction" steps can be considered the claimed later "electroless plating". As to the degree of swelling, Fedkiw indicates to use the same material (NAFION) and same solvent (methanol) as described by applicant as achieving the desired swelling, and therefore similar amounts of swelling would be expected. Furthermore, Fedkiw indicates that swelling is to increase the loading level, and solution concentration and time of immersion are to be controlled to achieve desired loading, indicating that swelling would be a result effective variable to be controlled to optimize loading. As to the resulting double layer capacitance being in the claimed range, the Examiner has further provided Munshi to this issue as described in the rejection above.

(B) Regarding the rejection using the admitted state of the prior art in view of Ventura, Sopchak (and now Munshi), applicant argues that Sopchak is concerned with conditioning polyesters and polyamides for electroless plating primarily by etching, and does not teach or suggest swelling the claimed 130%, and even if Sopchak suggests some swelling may occur, the present invention relates to a degree of swelling of 30% or more, and this amount is a significant advantage, and not inherent to any process in which a polymer is immersed in a solution, with water, for example, achieving only a 5% swelling, and Sopchak does not provide any suggestion as to the amount of swelling desirable or how to achieve that level of swelling, and rather would be concerned with

optimizing the etching effect, and as well Sopchak does not discuss polymer electrolytes. The Examiner has reviewed this argument, however, the Examiner notes that Sopchak specifically indicates the desire to swell the polymer with the organic solvent (column 4, lines 50-60), furthermore, the new reference to Munshi also indicates why it would be desired to swell in the process of admitted state of the prior art in view of Ventura, Sopchak and Munski as part of the process of providing a large double layer capacitance. As to achieving the optimization of swelling, Sopchak teaches using a variety of possible organic solvents (that provide swelling) in various wt%s (see column 4, line 50 through column 5, line 20) as well as time of exposure (column 5, lines 55-68), indicating variables that would be adjusted by one of ordinary skill in the art to adjust swelling using materials known to cause swelling. While Sopchak provides for optimization for etching purposes, optimization for swelling would also be a part of the process, firstly because swelling is a part of the use of the organic solvents, indicating a factor to be optimized and controlled, and also the desire for swelling as suggested through the use of Munshi. While applicant as shown different results from a swelling of more than 30 % and 5%, a showing commensurate in scope to what is claimed is not made. As discussed in MPEP 716.02(d), "Whether the unexpected results are the result of unexpectedly improved results or a property not taught by the prior art, the "objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support." In other words, the showing of unexpected results must be reviewed to see if the results occur over the entire claimed range. In re

Clemens, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980)". To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. In re Hill, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). Here, there are no results at just outside the claimed range (28%, 29%, for example), showing an unexpected benefit, for example.

(C) Regarding the rejection using the admitted state of the prior art in view of Ventura, Lin (and now Munshi), applicant argues that Lin is concerned with reformulating the surface of the polymer substrate, and does not teach or suggest an appropriate swelling amount, and much less the swelling of 30% or more, and this amount is a significant advantage, and while water was known to achieve swelling, applicant has discovered a more significant degree of swelling is appropriate. Moreover, applicant argues that the anticipated uses for the plated substances described in column 1 of Lin do not indicate plated substrates that are particularly deformable or bendable or appropriate for use as an actuator. The Examiner has reviewed this argument, however, the Examiner notes that Lin specifically indicates use of organic solvents that swell the polymer (column 4, lines 40-45), furthermore, the new reference to Munshi also indicates why it would be desired to swell in the process of admitted state of the prior art in view of Ventura, Lin and Munski as part of the process of providing a large double layer capacitance. As to achieving the optimization of swelling, Lin teaches using a variety of possible organic solvents (that provide swelling)

(see column 4, lines 40-75) can be used, time of exposure can be varied (column 5, lines 20-30), indicating variables that would be adjusted by one of ordinary skill in the art to adjust swelling using materials known to cause swelling. Optimization for swelling would also be a part of the process, firstly because swelling is a part of the use of the organic solvents, indicating a factor to be optimized and controlled, and also the desire for swelling as suggested through the use of Munshi. While applicant as shown different results from a swelling of more than 30 % and 5%, a showing commensurate in scope to what is claimed is not made. As discussed in MPEP 716.02(d), "Whether the unexpected results are the result of unexpectedly improved results or a property not taught by the prior art, the "objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support." In other words, the showing of unexpected results must be reviewed to see if the results occur over the entire claimed range. In re Clemens, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980)". To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. In re Hill, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). Here, there are no results at just outside the claimed range (28%, 29%, for example), showing an unexpected benefit, for example. As to Lin not suggesting a process for an actuator, the primary reference to the admitted state of the prior art teaches polymers electrolytes are used for actuator forming, and Ventura teaches that polyesters and other resins can be used for forming polymer electrolytes, and Lin

teaches resins that can be polyesters, etc. (and thus the same materials described by Ventura for electrolyte forming). Moreover, while Lin teaches examples of products that are not actuators, the process of Lin is not limited to these products, since general plating of substrates is provided (column 1, lines 15-30), and moreover, it is the Examiner's position that clothing (one of the things that can be plated in the listed examples) would be normally considered bendable.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1715